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PROTECTIVE COLORATION AND HABITS IN THE KELP-FISH

Heterostichus rostratus.

This blenny is one of the fishes characteristic of the belt of gigantic kelp (*Macrocystis*) which, along the coast of Southern California, grows in profuse beds in about ten fathoms of water. In form and color, and even in habits, the fish so closely resembles the "leaves" of the kelp as to be scarcely distinguishable from them. The thin body has the approximate form and proportions of the kelp thalli, and the long vertical fins of the fish might pass for their crinkled edges. While not as large as the average blade of kelp, this species is much larger than any of its near relatives. The usual color developed is the counterpart of that of the kelp. These peculiarities of form, size and color, considered by themselves, might well be construed as concealing protective, but when the correlated habits of the fish are taken into account, even the most skeptical could hardly deny their protective significance.

These blennies live along the great strands of kelp, one or two sometimes accompanying a plant, when, loosened from its anchorage, it floats toward the shore. The female, according to Holder, (1) constructs a nest in the kelp during the process of laying the eggs, which the male fearlessly guards. They feed upon the

invertebrates (chiefly crustaceans) of the kelp, and seldom wander even a few feet from the plant. They have even been observed (first by Holder, whose observation the writer has independently confirmed) poised vertically downward about the kelp, gently swaying their bodies back and forth, as the currents wave the blades of kelp.

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(1) Holder, *Am. Nat.*, 41, 1907, p. 587, fig.; Holder & Jordan, *Fish Stories* (Holt & Co.), 1909, chap. 29; Holder, *Bull. U. S. Fish Comm.* 28, 1910, p. 1140.

A CASE OF HERMAPHRODITISM IN THE WHITE PERCH, *Morone americana* (Gmelin).

In April 1919, Mr. John W. Titcomb, Fish Culturist of the New York State Conservation Commission, received from Mr. H. H. Abell of Poughkeepsie, New York, the reproductive organs of a hermaphroditic white perch, *Morone americana*. Through the courtesy of Mr. Titcomb who sent the specimen to the State Museum, the following notes are presented.

Cases of hermaphroditism have been recorded in individuals representing many genera of Teleostean fishes. The cod, *Gadus*, figures frequently in accounts of this kind and several species of *Serranus* are known to be regularly hermaphroditic and capable of self-fertilization. G. B. Howes, (1) who studied the cod, cites several examples, in one—a case described by Weber—a testis was borne at the posterior end of each ovary; in other specimens a single testis developed in conjunction with either a right or left ovary. H. C. Williamson (2) examined two specimens of the cod and found in one a small testis attached to the anterior extremity of each ovary; in the second case a single ovary of large size occupied the right side, a normal testis the left.

In the specimen here considered there is an ovary, 30-35 mm. long, attached by a short duct to the anterior end of each testis. Beneath the membranous covering of one testis a mass of eggs extends from the origin of the duct to the posterior end of the testis. Whether or not this mass of eggs marks the continuation of the duct and the outlet of the eggs through the vas deferens can not be determined. The testes which are about 25-30 mm. long, unite at their posterior ends in the normal way and are apparently well developed. If the eggs are discharged through the testes, the condition is the exact antithesis of that observed by Williamson in the cod, where the ovary functioned as a receptacle for both eggs and sperm cells. In the example cited by Howes the testes, although attached to the posterior end of the ovaries as in the white perch, discharged their contents into the ovaries themselves.

1. G. B. Howes. On Some Hermaphrodite Genitalia of the Codfish (*Gadus morrhua*), with Remarks upon the Morphology and Phylogeny of the Vertebrate Reproductive System: Jour. Linn. Soc., Vol. 23, pp. 539-558, 1891.
2. H. Charles Williamson. On two Cases of Hermaphroditism in the Cod, (*Gadus callarias*); 24th Ann. Rept., part 3, of the Fishery Board for Scotland, pp. 290-292, 1906.

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LARGE SPECIMENS OF TWO JAMAICAN REPTILES.

The destruction of reptiles on several of the West Indian Islands has proceeded so far that much of the information on the faunas must in the future be obtained from specimens now in museums. This is not alone true of the extinct forms, for in the species now diminished in numbers at least one character, maxi-

mum adult size, must apparently be determined from old specimens. Probably because the larger individuals are found more readily than the smaller ones, no large specimens of large forms are now taken on the islands inhabited by the mongoose. The following notes are presented as a contribution to our knowledge of the approximate maximum size attained by two Jamaican species.

There is in the Museum of Zoology, University of Michigan, a specimen of *Celestus occiduus* (Shaw) from Jamaica which is one of the largest that has been recorded, and probably approximates the maximum size reached by that species. The measurements are as follows:

Total length	475	mm.
Length of head and body	305	mm.
Length of tail	170	mm.
Length of hind leg to tip of longest toe	90	mm.
(Tip reproduced about 5 mm.)		
Length of front leg to tip of longest toe	68	mm.
Length of head	69	mm.
Width of head	55.5	mm.

The measurements are exceeded by those of a specimen recorded by Boulenger (Catalogue of Lizards in the British Museum, II, p. 290-291), the total length of which is 560 mm. (tail reproduced).

In the same collection there are three specimens of *Ameiva dorsalis* Gray which measure 115 mm., 115 mm., and 117 mm. from snout to vent. The appearance of these indicates that this is probably about the maximum size attained by the species.

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SOME NOTES ON NOTOPHTHALMUS VIRIDESCENS.

During the present season, as in preceding ones, several trips have been made by different members

of the Department of Zoology, of Smith College, to the "Williams Pond," on the Northwest slope of Mt. Toby, in the town of Sunderland, Mass. This pond, formed by the damming of a small brook, is about a quarter of an acre in surface, and from one to four feet in depth, and contains an abundant growth of *Rhizocolonium* (sp ?). The dam is an unusually good vantage ground for observing and collecting *Notophthalmus viridescens*, which are always present in considerable numbers.

The first and second trips this Fall were made by Dr. and Mrs. H. H. Wilder, on August 31 and September 21, respectively. On both trips large numbers of adults were present, and such quantities of individuals of 1919's hatch, that four or five specimens were caught by each sweep of the net. They were usually imprisoned in the *Rhizocolonium* and easily seen by holding the matted mass of the alga up to the light. On August 31, these specimens were all typically larval, whereas on September 21 the majority of those examined were metamorphic. At this time a few stones near the shore were turned over for completely metamorphosed individuals; but no conclusions can be drawn from the fact that none were found, as the search was not sufficiently prolonged. Of the fifteen specimens of this collection living in the Laboratory on October 1, all but one were nearly or quite metamorphosed, and one of these when sectioned was found to have eaten his molt.

The next week, September 28, a rather more extended trip was made by a larger representation of the Department. At that time, although adults were as plentiful as ever, continued netting and careful examination of the alga resulted in obtaining only two larvae and three metamorphic individuals. On the shore and in a hollow a few rods back from the water under chips and stones were found ten recently metamorphosed terrestrial larvae. Their small size and protective coloration explains the fact that no

more than this were found. In the above-mentioned hollow and along the edges of the brook which feeds the pond, twenty-five one and two year old terrestrial larvae were collected. None of these were bright red, and the larger ones were quite dark green, but the skins of all were characteristically rough.

The results obtained this season correspond very closely with those of other years, but for which I have less accurate data. In 1917 and 1918 young specimens were collected in considerable numbers from the water early in September, and these were metamorphosing in the Laboratory at the opening of College about the twentieth of the month. In 1917 (September 23?) a large number of terrestrial larvae of varying sizes were collected. Twenty of these, all of a bright scarlet color, were under one log. Those found nearer the water, both large and small ones, were much darker in color. The specimens from that collection were kept in a combination terrarium and aquarium in the laboratory until June. The large ones very soon became very green in color and a few acquired the smooth skin of the adult. Most of them retained the rough skin, however, but went into the water at times, and all seemed equally at home in the water, on the moss under a wet stick, or balanced on the end of a fern frond. What they would have done in their natural habitat, I do not know.

These observations seem to show that the duration of metamorphosis is comparatively short and that most of the animals emerge from the water in this region within a few days about the middle of September; that the skin color of the terrestrial stage is variable, and that after becoming green, the animals do not remain wholly in the water.

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REPRODUCTION OF THE MARBLED
SALAMANDER.

On October 3, 1919, I was in the low grounds of Walnut Creek, near Raleigh, N. C., in the general locality in which I had been in the habit of finding the eggs of the marbled salamander (*Ambystoma opacum*) and as it was the proper time of the year to find them, I proceeded to look for the same. I found none under any of the dead logs lying about in the dried up pools, and by a happy thought decided to look in the heaps of drift rubbish brought down and piled up by the heavy rains of last July.

In one of these piles near the bottom I found two pieces of thick pine bark lying with their inner concave sides facing one another, and on separating them, a female opacum was observed and captured, while lying on the bottom piece of bark were her eggs. I covered up the eggs again and left them. Four days later Prof. Z. P. Metcalf of the State College, went with me to the place and photographed the eggs in situ. We then again covered them up for future reference.

On Nov. 24, 52 days later, I was again in the same neighborhood and looked up the eggs, finding them still unhatched but close to hatching. I put them in a bottle and took them home. Two days later I found they were trying to hatch out and that some of the larvae were dead. They were then put in water and the living and dead larvae separated.

The newly hatched larvae were about 19 mm. long, and had the front pair of legs well developed with three well formed fingers, and a fourth budding out.

It may also be noted that these were the only eggs of opacum which I have found that were not lying in contact with the soil.

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NOTE ON THE FLORIDA GOPHER FROG,

Rana aesopus.

In Stejneger & Barbour's Check-list of N. A. Amphib. & Reptiles, *Rana aesopus* Cope is listed as occurring only in Florida, viz: Type Locality: Miccanopy, Florida. Range: Florida.

In the writer's possession is an adult male, collected in May, 1919, by Chas. E. Snyder, near Pine-lands, Hampton Co., South Carolina, and it is quite likely that the species extends a good deal further north and east than even this locality. The specimen is in fine condition and not at all shy, taking mealworms, roaches and spiders and occasional earthworms from one's fingers, if not approached too suddenly. When the interior of the large glass jar in which it lives is sprinkled, and after this certain noises are made, like rustling paper, or water running from a tap, this frog "sings." The call resembles a loud snore similar to that of *Rana pipiens*, but much coarser and louder. During the calls, which are repeated about every two seconds and are of from three to five seconds' duration, the vocal vesicles over the arms are distended into hemispheres about the size of large hazelnuts.

The writer has also collected this species during its breeding season in February, near Jacksonville, Fla., in 1912.

The specimen mentioned here was caught in a cage-trap set among the sandhills to catch small rodents.

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